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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/654,501 09/01/00 TAKAHASHI

Y PM 273792

000909
PILLSBURY WINTHROP LLP
1600 TYSONS BOULEVARD
MCLEAN VA 22102

MMC2/1108

EXAMINER

BAUMEISTER, D

ART UNIT

PAPER NUMBER

2815

DATE MAILED:

11/08/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/654,501

Applicant(s)
Takahashi et al.

Examiner
William Baumeister

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jun 12, 2001
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 3 20) ☐ Other: _____

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DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on applications filed in Japan on 9/2/99 and 12/17/99. It is noted, however, that applicant has not filed a certified copy of the foreign application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 21 from which claim 22 depends sets forth that a second light source including a first fluorescent material emits green light. Claim 22 further defines this phosphor material with a Markush group which includes $\text{YVO}_4:\text{Eu}$. However, $\text{YVO}_4:\text{Eu}$ emits red light--not green (see Phosphor Handbook, pg 394). As such, this composition does not further limit the claim from which it depends, and one skilled in the art would not be apprised of the intended claims scope. **Applicant is required to confirm that all of the compositions recited in this Markush group emit at least green light, or make appropriate correction to the claim(s).**

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Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 10, 21-23, 26-28 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Butterworth et al. '507. Butterworth discloses UV/blue LEDs disposed in a cup-shaped reflector/lead frame and which are overcoated with any of various fluorescent-dye-containing epoxies 240. One phosphor listed is ZnS:Cu,Al,Au (col. 3, line 54). Butterworth also states that multiple dyes can be employed to produce white light (i.e., also use a red dye) (col. 3, line 5).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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7. Claims 1-7, 9, 10, 21-23, 26-31, 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vriens et al. '753 (supplied by Applicant in IDS paper #3) in view of Butterworth '507. Vriens '754 discloses blue/UV semiconductor LEDs disposed in cup-shaped lead frames which are coated with transparent materials such as epoxy. Phosphors emitting a single color or multiple colors (e.g., red green, blue, yellow or white; col. 3, lines 52-56) are added to the transparent material in order to absorb the UV/blue light and re-emit a secondary color(s) to get a good/desired color rendering. Vriens also discloses that the cup filled with the phosphor-epoxy mixture may be encapsulated in a transparent epoxy with much larger dimensions and with a dome-shaped (bullet) top. Vriens does not disclose the specific fluorescent materials that may be employed for obtaining these colors.

a. Butterworth discloses blue/UV LEDs that are coated with fluorescent dyes for obtaining various colors including white light. As mentioned above, the disclosed dyes include, *inter alia*, phosphors such as ZnS:Cu,Al,Au and various red dyes. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ ZnS:Cu,Al,Au as taught by Butterworth for the fluorescent material of Vriens for the purpose of obtaining a various resultant colors including white light as taught by both Vriens and Butterworth.

8. Claims 1-7, 9, 10, 21-23, 26-31, 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vriens et al. '753 as applied to the claims above in view of JP 10-163,535 (both

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supplied by Applicant in IDS paper #3). As stated, Vriens does not disclose the specific fluorescent materials that may be employed for obtaining these various colors.

a. JP '535 discloses blue/UV LEDs that are coated with phosphors for obtaining white light. One such phosphor disclosed is ZnS:Cu,Al,Au (col. 4, line 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to employ ZnS:Cu,Al,Au as taught by JP '535 for the phosphor of Vriens for the purpose of obtaining a resultant white light as taught by both Vriens and JP '535.

9. Claims 8 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Vriens/Butterworth or Vriens/JP '535 as applied to the claims above, and further in view of Lowery '316 (supplied by Applicant in IDS paper #3). Vriens, Butterworth and JP '535 do not appear to disclose grading for the fluorescent material. Lowery discloses UV/blue LEDs covered with a phosphor for obtaining various colors including white light. Lowery discloses that the coating may be composed of a transparent epoxy layers 64, 66, 68 with the phosphors contained in the layer 64 (i.e., the epoxy spacer layer 64 and the phosphor-containing layer 66 comprise the claimed first layer having a step-wise graded fluorescent material. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the step-graded phosphor epoxy design of Lowery in the LED devices taught by either Vriens/Butterworth or Vriens/JP '535 for the purpose of obtaining better light uniformity as taught by Lowery.

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10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vriens/Butterworth or Vriens/JP '535 as applied to the claims above, and further in view of the Phosphor Handbook. None of Vriens, Butterworth or JP '535 appears to disclose the use of CaS:Eu phosphors for emitting red light. The Phosphor Handbook (pages 192-193) teaches that CaS:Eu emits red light. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ within the Vriens device a CaS:Eu phosphor for emitting red light as taught by the Phosphor Handbook, depending only upon obvious design considerations such as the associated material and manufacturing costs of the various red dyes available, or the specific hue of red desired.

a. Note that in response to a telephone conversation, Ms. Kelly at the CRC Press sent the Examiner confirmation (via e-mail) that this textbook was published on September 10, 1998.

11. Claims 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vriens '753 and Lowery '316 (for claim 18 only) as applied to the claims above, and further in view of Do et al. '296. As was explained, Vriens teaches all of the limitations except for the grading of the fluorescent material (claim 18) which is taught by Lowery and the specific composition of the fluorescent material that may be employed. Do teaches in the BACKGROUND section that conventional phosphors emitting red light in response to UV light include Ce activated YVO₄ or Y₂O₂S (col. 1, lines 20-28 and 61-). It would have been obvious to one of ordinary skill in the art at the time of the invention to employ any of these conventionally known red-emitting

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phosphors in the Vriens device, the specific one ultimately chosen depending only upon obvious design considerations such as the associated material and manufacturing costs of the various red dyes available, or the specific hue of red desired.

12. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vriens as applied to the claims above. Vriens discloses blue/UV LEDs having various phosphors coated thereover for achieving desired color renderings, but does not disclose the use of a second, red-emitting semiconductor LED to be employed in conjunction therewith. Nonetheless, red LEDs have been known for the last several decades (e.g., GaAs-based LEDs). Further, it has also been known that multicolor emission can be achieved from LEDs either by stacking LEDs on top of each other or alternatively by setting them in close adjacent proximity to each other, either with or without the further use of reflectors/lenses. Further, it has been well known for centuries that combining red, blue and green lights produces white light. Given that Vriens teaches a single LED chip with one or more color-emitting phosphors, on the one hand, and it was known to alternatively employ multiple LEDs to produce blended light, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine these two technologies at least to provide one LED with a phosphor overcoat and a second LED to thereby obtain the three primary colors to obtain white light. The motivation for choosing any specific one of these three options (one LED w/ multiple-color phosphors, two LEDs w/ one phosphor or three LEDs) depends merely upon obvious design considerations such as the application of the devices (dictating the viewing-angle

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requirements), the space requirements, the amount of independent control over three colors desired (which also takes into account the fact that if a phosphor-coated LED burns out or deteriorates, the light emitted from the phosphor overcoat also decreases), and the manufacturing costs of phosphors vs. LEDs.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


a. Justel et al. '250

INFORMATION ON HOW TO CONTACT THE USPTO

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at (703) 306-9165. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

B. William Baumeister

November 5, 2001


EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800